

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) An angular velocity sensor comprising:

- a tuning fork vibrator including
 - a first vibrating arm having a first end and a second end, the first vibrating arm having a fundamental vibration frequency,
 - a second vibrating arm having a first end and a second end, the second vibrating arm having the fundamental vibration frequency, and
 - a coupling portion for coupling the first end of the first vibrating arm to the first end of the second vibrating arm;
- a drive unit ~~provided on the first vibrating arm~~, for causing the first vibrating arm to vibrate, the drive unit being provided on the first vibrating arm, the drive unit having a driving resistance; ~~and~~
- a detection unit ~~provided on one of the first vibrating arm and the second vibrating arm~~, for detecting an amount of deflection of ~~the one of the first vibrating arm and the second vibrating arm when deflecting due to an angular velocity applied to the tuning fork vibrator~~, the detection unit being provided on the one of the first vibrating arm and the second vibrating arm; and
- an auxiliary weight unit provided on the first vibrating arm and between the drive unit and the second end of the first vibrating arm, the auxiliary weight unit being separated from the drive unit and the detection unit, wherein the auxiliary weight unit includes
 - a first electrode provided on the first vibrating arm,
 - a piezoelectric layer provided on the first electrode, and
 - a second electrode provided on the piezoelectric layer,
- and wherein a ratio $R1/R2$ is smaller than “1”, where $R1$ is the driving resistance at the fundamental vibration frequency, and $R2$ is the driving resistance at a vibration frequency different from the fundamental vibration frequency.

2. (Currently Amended) The angular velocity sensor according to claim 1, wherein[[,]] the first vibrating arm has nodes at the first end of the first vibrating arm and at a point between

the first end and the second end of the first vibrating arm when the first ~~vibration~~ vibrating arm vibrates at the frequency different from the fundamental vibration frequency.

3. (Currently Amended) The angular velocity sensor according to claim 1, wherein the drive unit includes

a first electrode provided on the first vibrating arm from the first end of the first vibrating arm toward the second end of the first vibrating arm,

a piezoelectric layer provided on the first electrode from the first end of the first vibrating arm toward the second end of the first vibrating arm, and

a second electrode provided on the piezoelectric layer from the first end of the first vibrating arm toward the second end of the first vibrating arm, the second electrode having a length (D) in a direction from the first end of the first vibrating arm toward the second end of the first vibrating arm, wherein the first vibrating arm has a length (L) from the first end thereof to the second end thereof, and satisfies wherein the length (D) and the length (L) satisfy a relation of $0.38 < D/L < 0.46$.

4. (Currently Amended) The angular velocity sensor according to claim 1, wherein the detection unit includes

a first electrode provided on the one of the first vibrating arm and the second vibrating arm from the first end of the one of the first vibrating arm and the second vibrating arm toward the second end of the one of the first vibrating arm and the second vibrating arm,

a piezoelectric layer provided on the first electrode from the first end of the one of the first vibrating arm and the second vibrating arm toward the second end of the one of the first vibrating arm and the second vibrating arm, and

a second electrode provided on the piezoelectric layer from the first end of the one of the first vibrating arm and the second vibrating arm toward the second end of the one of the first vibrating arm and the second vibrating arm, the second electrode having a length (D) in a direction from the first end of the one of the first vibrating arm and the second vibrating arm toward the second end of the one of the first vibrating arm and the second vibrating arm, wherein

the one of the first vibrating arm and the second vibrating arm has a length (L) from the first end thereof to the second end thereof, and ~~satisfies~~ wherein the length (D) and the length (L) satisfy a relation of $0.38 < D/L < 0.46$.

5. (Cancelled)

6. (Currently Amended) The angular velocity sensor of claim 1, wherein the ~~additional~~ auxiliary weight unit has a shape which can be adjusted to control vibration directions of the first vibrating arm and the second vibrating arm.

7. (Currently Amended) A method for designing an angular velocity sensor which includes

a tuning fork vibrator including

a first vibrating arm having a first end and a second end, and having a fundamental vibration frequency,

a second vibrating arm having a first end and a second end, and having the fundamental vibration frequency, and

a coupling portion for coupling the first end of the first vibrating arm to the first end of the second vibrating arm,

a drive unit ~~provided on the first vibrating arm~~, for causing the first vibrating arm to vibrate, the drive unit being provided on the first vibrating arm, the ~~driving drive~~ unit having a driving resistance, and

a detection unit ~~provided on one of the first vibrating arm and the second vibrating arm~~, for detecting an amount of deflection of ~~the one of the first vibrating arm and the second vibrating arm when deflecting due to an angular velocity applied to the tuning fork vibrator~~, the detection unit being provided on the one of the first vibrating arm and the second vibrating arm, and

an auxiliary weight unit provided on the first vibrating arm and between the drive unit and the second end of the first vibrating arm, the auxiliary weight unit being separated from the drive unit and the detection unit, wherein the auxiliary weight unit includes

a first electrode provided on the first vibrating arm,
a piezoelectric layer provided on the first electrode, and
a second electrode provided on the piezoelectric layer

said the method comprising:

determining a size of the first vibrating arm; and

determining a size of the drive unit so that a ratio $R1/R2$ is smaller than “1”, where $R1$ is the driving resistance at the fundamental vibration frequency, and $R2$ is the driving resistance at a frequency different from the fundamental vibration frequency.

8. (Currently Amended) The method according to claim 7, wherein[[,]] the first vibrating arm has nodes at the first end of the first vibrating arm and at a point between the first end and the second end of the first vibrating arm when the first ~~vibration~~ vibrating arm vibrates at the frequency different from the fundamental vibration frequency.

9. (Currently Amended) The method according to claim 7,
wherein the drive unit includes

a first electrode provided on the first vibrating arm from the first end of the first vibrating arm toward the second end of the first vibrating arm,

a piezoelectric layer provided on the first electrode from the first end of the first vibrating arm to the second end of the first vibrating arm, and

a second electrode provided on the piezoelectric layer from the first end of the first vibrating arm to the second end of the first vibrating arm, the second electrode having a length (D) in a direction from the first end of the first vibrating arm to the second end of the first vibrating arm,

wherein the first vibrating arm has a length (L) from the first end thereof to the second end thereof, and

wherein said determining of the size of the drive unit comprises determining the length D of the drive unit so as to satisfy ~~the~~ a relation of $0.38 < D/L < 0.46$.

10. (New) The angular velocity sensor according to claim 3, wherein the first electrode, the piezoelectric layer and the second electrode of the auxiliary weight unit have a same structure as that of the first electrode, the piezoelectric layer and the second electrode of the drive unit, respectively.

11. (New) The angular velocity sensor according to claim 4, wherein the first electrode, the piezoelectric layer and the second electrode of the auxiliary weight unit have a same structure as that of the first electrode, the piezoelectric layer and the second electrode of the detection unit, respectively.

12. (New) The method according to claim 9, wherein the first electrode, the piezoelectric layer and the second electrode of the auxiliary weight unit have a same structure as that of the first electrode, the piezoelectric layer and the second electrode of the drive unit, respectively.